



Aero Energy

LM6-200 - V.1 Final

LM6000PD Hot Section Removal/Installation Technical Report

July 7, 2020

For Customer

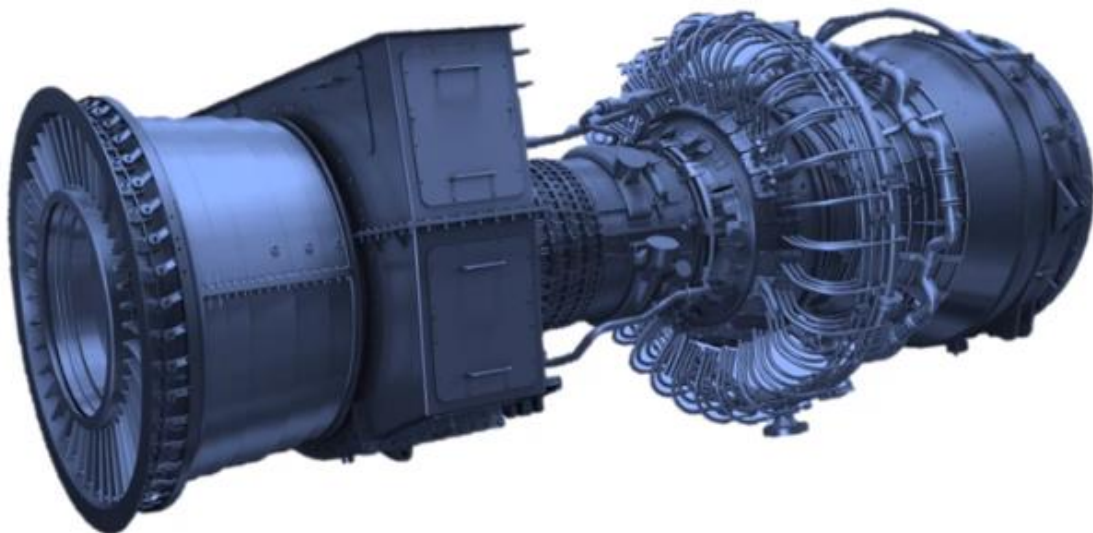
UNIPER

**Site den Haag
Unit #
ESN 192-229**

Under

**GE Oracle Project: I01-051443
GE Aero Houston Service Shop PO: 7302270
GE Aero Houston Service Shop WO nb. Z6JVNL1866283_JV**

Customer Representative: Gerrit Scharff
Fleet Support: Virgil Adam
GE Service Shop Representative: Samuel Gutierrez – Bill Dickens



All technical recommendations and information contained in this report are based on GE manuals that have been developed and approved for use with GE engines and parts that have been operated and maintained in accordance with GE technical documentation and recommendations.

GE has no technical knowledge of, nor obligation for, Non-GE approved parts and repairs. Accordingly, this report is not intended to apply to Non-GE approved parts and repairs, nor to any parts that may be directly or indirectly affected by Non-GE approved parts and repairs.



DETAILS AND DATA

Engine Data:

ESN	192-229	Engine Fired Hours	53243	Package Hours	53243
Model	DLE	Engine Fired starts	1797	Package Fired Starts	1797
	2013 HSE	Fired Hours	23807		
		Fired starts	716		
	2020 HSE+TRF	Fired Hours	29436		
		Fired starts	1081		

Purpose of Houston Shop Visit:

The purpose of this shop visit was to perform a Hot Section and TRF exchange as per hereunder described scope details and as per OEM service manuals/documentation.

Scope:

Hot Section Exchange, removal of current Combustor - Stg 1 Nozzle - Stg 2 Nozzle - HPT Rotor and replace for rotatable modules.

LPT inspection, removal of current LPT – BSI LPT rotor and report findings – remove TRF and replace for rotatable TRF (overhauled condition)

Visual inspect VIGV hardware, reported 3% deviation issue

Overhaul VBV Doors, set new doors will be installed

Exchange Premixers, install Flow & Pressure Tested set (overhauled condition)

HPC will be opened to perform stage 3 to 5 blades replacement

- Unplanned LPC-HPC Cleaning Scope Steam/Ice blasting:

VIGV's and # 5 race removal for cleaning purposes.

Perform HPC / LPC rotor Ice Blasting Cleaning.

Perform HPC / LPC casings Steam Cleaning and Ice Blasting.

Rotables in Scope WF ID #203824148 incl. applicable Service Bulletins:

HPT Rotor - ROTOR ASSEMBLY: HPT – Complies with SB-266 (SB-246 NA as new disk is installed)

Stg 1 Nozzle - NOZZLE, STG1: HPT – Complies with SB-246, SB-306 and SB-267

Stg 2 Nozzle - NOZZLE, STG2 - HPT – Complies with SB-238, SB-339 (incl SB-322)

Combustor (Threaded) L38577G09

TRF, TURBINE REAR FRAME AND SUMP ASSEMBLY

Service Bulletins in Scope:

High Pressure Turbine Nozzle Stg 1: SB-306, SB-267

High Pressure Turbine Nozzle Stg 2: SB-238, SB-322, SB-339 (incl 322)

High Pressure Turbine Rotor: SB-266, (SB-246 is Obsolete as new disk is used)

Turbine Rear Frame: SB-323

CRF Oil Manifold Hardware Improvement: SB-308

HPC stage 3 -5 blades replacement: SB-310

Re-Comply with SB213 (Kit PN 737L694G02): SB-213

High Level Schedule Den Haag GT-192-229 HS+ TRF Houston:

Start removing GT FC	: Wednesday 20 th of May
On transport to Schiphol/Houston	: Thursday 28 th of May
GT arrival Houston	: Wednesday 3 rd of June
Houston Shop start date removal LPT	: Monday 4 th of June
Houston LPT Induction date gate#3	: Monday 8 th of June
Engine mech. completion date	: Monday 8 th of July
Engine test run date (test cell Houston)	: Monday 8 th to 12 th of Aug
Engine end BSI	: Friday 14 th of Aug
TAT 75day's from Induction date	: Friday 21 st of Aug
Engine return shipment date	: Friday 15 th of Aug
Engine received at den Haag	: Thursday 20 th of Aug



Performed Work Summary:

June 4, 2020

Engine was brought into shop. Engine was removed and place on maintenance dolly. LPT and LPC was borescope. Once LPT is removed will inspected STG 1 nozzle and honeycomb seals. A report out is included for this inspection. LPT air piping removal in progress. Reviewed parts lists and provided parts needed for SB 310 and premixer install. We did receive a set of premixers qty 30.

June 5, 2020

Performed engine external inspection. Inspect chip detectors. Removed LPT and place on stand and inspect STG 1 nozzles and honeycomb seals. LPT inspection completed, placed LPT on wooden pallet for gate #3 TRF scope, LPT will be ready for pickup. Start HPT removal. Removed rotating seals. Removed HPT flange bolts.

June 6, 2020

Remove HPT on place on vertical stand. Removed #5 nut, race, and heat shield. Separate S2N from HPT. Remove S1N. Remove premixers. There are four broken bolts on pre mixers. These broken bolts will need to be drill out.

June 7, 2020

All premixers are removed. Removed CRF oil manifold per SB 308. Removed VSV hardware from HPC case. Removed all broken bolts on fuel nozzle pads.

June 8, 2020

Remove HPC split line hardware. Remove top case. Remove STG 3-5 blades. Performed VIGV rig check. Minor adjustments made to the Actuator brackets to set insert pin at -10 degrees. Installed CRF aft case. Performed visual inspection on HPC upper case. Recommendation to send VIGV and # 5 race to for cleaning. Also blades on LPC and HPC rotors have buildup and need to be cleaned. HPC top case is removed and blades and vanes are exposed. Would need to top case the LPC rotor to clean blades. Steam and Dry ice cleaning is advised to perform.

June 9, 2020

Install HPT dummy case to CRF aft case. Install LPT dummy case onto HPT dummy case. Remove VSV hardware from lower case. Install HPC dummy case Remove lower HPC case. Visual inspection performed on vane. Several vanes will be replaced due to damage found on STG 2 and STG 3. Recorded PN and SN of removed pre mixer. Per mixer will be boxed and send to GE Asset Management.

June 10, 2020

Run blade plot on STG 3-5 blades. Start on SB 213 on upper and lower cases. Unison rings inspected. All rub buttons will be replaced. Parts and hardware for SB 213 have not been received. Parts kit for VBV door replacement was received. All 12 VBV doors and hinges where replace. Rotable modules, Combustor, S1N, and S2N where received today.

June 11, 2020

Continue with SB 213. Delivery of HPC stage 3-5 blade set SB310 and HPT rotor is expected on Friday. Waiting on reply for VIGV, LPC rotor, and HPC rotor blade dry ice cleaning.

June 12, 2020

Remove VIGV place on pallet. Remove all sprint tubing from LPC. Two tubes will need to be replaced due to seized b nut. Remove upper and lower LPC stator cases. Continue with external inspection. Inspect air piping and attach new seal and gaskets.

June 13, 2020

VIGV and # 5 race was sent to shop cleaning facility. Install S2N on HPT rotor. On hold, waiting on parts for Kit PN 737L694G02. We received parts SB-213. Complied with SB 213 on HPC lower case. Received parts for CRF Oil Manifold Hardware Improvement SB-308. We are missing tube 2092M50P01. We inventoried parts for fuel system. A list of parts missing will be sent by email.



June 14, 2020

Complied with SB 213 on HPC upper case. Take drop measurement on HPT. Install HPT lift and turn fixture. Install #5 race, nut, and heat shield. Email was sent for additional parts needed for LPC.

June 15, 2020

Dry ice tooling arrives today. Prep LPC rotor, HPC rotor, HPC cases and LPC cases for dry ice cleaning. Received part for replacing damages vanes and shrouds on HPC stator cases. Removed damage vanes and shrouds. New vanes will require bench grind.

June 16, 2020

Email was sent to get clarification on blade kit 682L929G04. SB 310 call out for 682L929G02. We received partial vanes for HPC cases. 8 vanes were blended to the length of vanes been replaced on stage 3. on lower case. Waiting on 7 more vanes to replace on upper case. Dry ice cleaning on LPC rotor.

June 17, 2020

STG 3-5 blade kit 682L929G04 blades where weighed and plotted to as removed blade plot. Dry ice cleaning on HPC rotor. HPC and LPC cases where send for cleaning. Email was sent on what parts we have not received.

June 18, 2020

Continue with LPC and HPC rotor dry ice cleaning. LPC and HPC cases where steam cleaned at cleaning facility. HPC cases required dry ice cleaning. LPC cases where cleaned and no dry ice cleaning need.

June 19, 2020

Still waiting on LPC shrouds for upper cases. LPC cases will not be installed until shrouds are replaced. Waiting on HPC vanes to replaced damage ones. HPC cases will not be installed until vanes are replaced. Critical path is shrouds and vanes to replaced. Install STG 3-5 blades on HPC rotor per SB 310. Installed STG 2 and 3 shrouds on HPC.

June 20, 2020

Contacted accumulation to inquire about remaining parts. No shrouds and vanes delivered yet. Email was sent to get a confirmation on reusing STG 3 shroud with damage Teflon seal. Install shrouds on LPC cases once's received. Replace damage vanes on HPC once received. Install LPC cases. Install HPC cases.

June 21, 2020

On hold for HPC install due to missing vanes. Prep and gather engine hardware.

June 22, 2020

On hold for HPC install due to missing vanes. Prep and gather engine hardware.

June 23, 2020

Checked with accumulation and did recover the LPC STG 3 shroud. Installed new shroud and new bushings on LPC upper case. Install Upper and lower LPC cases. LPC split line was torqued. Install VIGV. Install HPC dummy case.

June 24, 2020

Install remain parts on LPC and VIGV. Remove LPT and HPT dummy cases and set aside. Install rotatable combustor. Install pre mixers. Work on CRF oil manifold per SB 308. Installed new piston ring on forward sump.

June 25, 2020

Work on CRF oil manifold per SB 308 is complete. Continue with pre mixer install. Install and torque fuel flex hoses. Will need 12 c seal for baffles.



June 26, 2020

Install CRF AFT case. Install #5 bearing housing and oil seal. Torque premixers and fuel flex hoses. We received LPT coupling nut and LPC sprint tube.

June 27, 2020

Install mini nozzle. Install S1N. Take HPT drop measurements. Install HPT and apply final seating torque. Install rotating seal.

June 28, 2020

Take LPT drop measurements. Install LPT and apply seating torque. Apply torque to flange bolts. Start heat shield install.

June 29, 2020

Apply final torque on coupling nut. Install LPT to HPT flange hardware. Install rear drive adaptor nut. Start LPT air piping install.

June 30, 2020

Continue with heat shield install. Air piping install. STG 1 and STG 2 borescope plugs where order. Borescope plugs will be replaced due to wear at tip. Also, one bracket for heat shield was placed on order. HPC vane work will continue once vane are delivered.

July 1, 2020

Baffles installed, bolt where torqued and safety wired. HPC work is on hold due on parts not arrived. LPC sprint manifold also on hold due to parts not arrived.

July 2, 2020

Lower case has one vane to replace. New vane will be swap from upper case. Install lower HPC case. Received 7 vanes for HPC upper case. Vane where grinded to match the length of damage blades. All vane works complete on HPC upper case. Installed upper case and split lines torqued. LPC sprint manifold also on hold due to parts not arrived.

July 3, 2020

Torqued circumferential flanges on CFF and CRF. Safety wire bolts on CFF. Perform IGV rigging. All J tubes where removed from HP sprint nozzles and metal caps installed.

July 4, 2020

New rebutton on stage 3-5 where replaced. VSV rigging will be performed. Start air/oil piping install.

July 5, 2020

Continue with external engine connections. Engine was missing hoses and tubes at induction. A list has been provided. Missing at induction L46408P03 hose qty 2, MS9557-14 bolt qty 12, MS9557-09 bolt qty 12, J1092P04 nut qty 12, J219P05 gasket qty 6, J219P04 gasket qty 1, MS9489-07 bolt qty 4, L45989G01 tube qty 1, L45554G01 tube qty 1.

July 6, 2020

Perform engine external inspection. Collect and organize all tooling used. Prep engine for shipment. We need direction if engine should be put in shipping container.

July 7, 2020

No parts where delivered. Email from Elias Ramos confirm tubes for sprint should be deliver but nothing yet. T48 have no update or status.

No parts where delivered. Email from Elias Ramos confirm tubes for sprint should be deliver but nothing yet. T48 have no update or status. Engine container was brought into shop. Engine will be put inside shipping container tomorrow.

July 8, 2020

No parts where delivered. Email from Elias Ramos confirm tubes for sprint should be deliver but nothing yet. T48 have no update or status. Engine container was brought into shop. Engine will be put inside shipping.



July 9, 2020

Start with sprint tube installation.

July 10, 2020

Engine is in shipping container. Sprint system complete. Container lid is not installed as we are still having the T48 probes pending.

July 18, 2020

Prep engine for borescope inspection.

July 19, 2020

Performed pretest borescope inspection. LPC and LPT borescope. A video borescope inspection will be performed. A copy of video will be given to Adrianna Trejo

July 20, 2020

Video borescope of HPC and HPT. Six T48 probes are on order. Pending T48 install. No delivery on T48 probes. We gather hardware for T48 and oil lines. Addressed discrepancies noted from QA inspection. There was one previous nick found on HPC STG 13 LE blade. Nick is within serviceable limits. Email was sent to Gerrit with pictures and measurements. We will wait for reply/disposition.

July 21, 2020

Performed HPC top case to replace one STG 13 blade found to have a nick on LE. Blade was replaced with new. Top case reinstalled.

July 22, 2020

Continue with top case installation. Install all removed air piping. Install T48 probes and oil lines when received. Test tech can help inspecting the engine for test hardware required. QA inspector to perform final inspection.

July 24, 2020

Findings during the final QA inspection, HPC stator vane bushings were loose beyond limitations the locations are stages 0 through 2 and changing the outer washers, oil residual on 90% of Stg 5 blades of the LPT. Recommended changing all effected bushings. We processing to replacing bushings as corrections and the NSRs will be created as well.



Hot Section Exchange, removal of current Combustor - Stg 1 Nozzle - Stg 2 Nozzle - HPT Rotor and replace for rotatable components.

Conclusion –

LPT was removed and sent to Gate#3 for LPT Inspection and TRF exchange. HPTR, S2N, S1N, and combustor was replaced with rotatables.

Maintenance Data:

WP, SB, SL, PB, PL Performed	Revision/manual reference	Date completed	Comments
WP 2710 00	LOW PRESSURE TURBINE (LPT) MODULE REPLACEMENT	June 4, 2020	Non
WP 2610 00	STAGE 2 HIGH PRESSURE TURBINE (HPT) NOZZLE (ON ENGINE) REPLACEMENT	June 5, 2020	Non
WP 2511 00	STAGE 1 HIGH PRESSURE TURBINE (HPT) NOZZLE REPLACEMENT	June 6, 2020	Non
WP 2510 00	COMBUSTION CHAMBER REPLACEMENT	June 6, 2020	Non
WP 2610 00	HIGH PRESSURE TURBINE (HPT) MODULE REPLACEMENT	June 7, 2020	Non

Parts Data:

Description	PN Removed	SN Removed	Qty	Disposition	PN Installed	SN Installed
COMBUSTOR	L38789G01	LAO73222	1	replaced	L38577G09	LAO85747
S1N	L43945G05	FCP590AA	1	replaced	L43747G06	FCP55ROP
S2N	L43404G08	MUNBT657	1	replaced	L43404G11	MUNBT829
HPT	L43510G13	MUNCG605	1	replaced	L43510G20	APV2648F
TRF	L43911G01		1	replaced	L43911G01	FIAALM41
LPT module	L43909G03	VOLD3507	1	re-installed Inspected	L43909G03	VOLD3507
Coupling nut	L61437P01	TEJK889	1	replaced	L61437P01	TEJV0294
Pressure tube	Not visible		1	replaced	9272M76G08	TMT3RS86



MISC. ENGINE PHOTOS



LPT removal

LPT removal



LPT removal

HPT removal

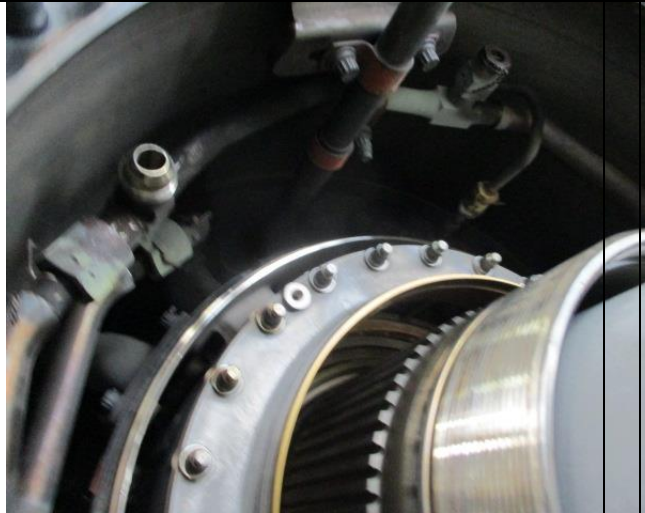


S1N removal

Combustor removal



MISC. ENGINE PHOTOS



CRF oil manifold removal per SB 308



CRF oil manifold removal per SB 308



CRF oil manifold install per SB 308



CRF oil manifold install per SB 308



CRF oil manifold install per SB 308



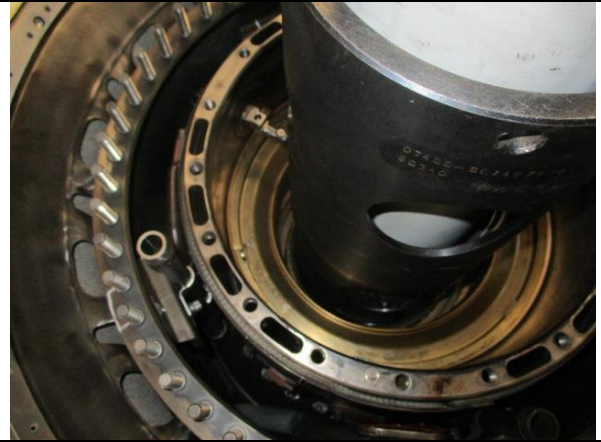
CRF oil manifold install per SB 308



MISC. ENGINE PHOTOS



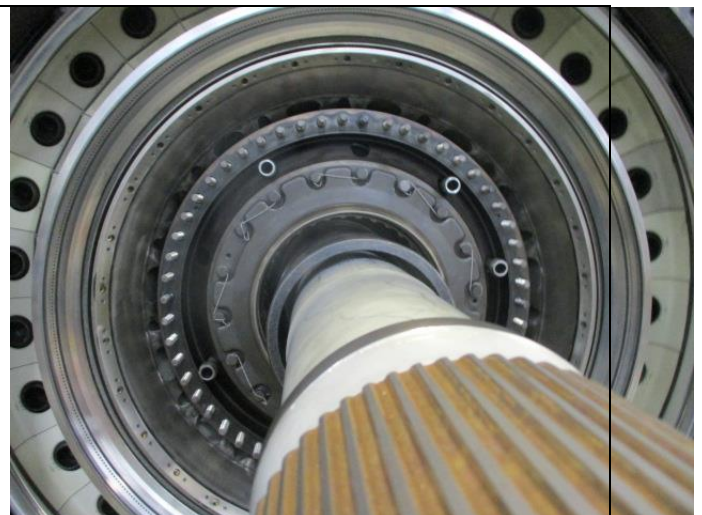
Rotable Combustor install



AFT sump install



#5 bearing housing install



#5 oil seal install



Rotable S1N install



Rotable S1N install



MISC. ENGINE PHOTOS



Rotable HPT install



Rotable HPT install



LPT with TRF Rotable install



LPT with TRF Rotable LPT install



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LM6-200 -

High Pressure Turbine Rotor Removal and installation Data Sheet

6/26/2020 Data Required

AutoMatic equation

H.S. A. at removal Just as a reference Not to be Used

Measurement for Installation

Measurement J 15.805 Should be 15.783 to 15.824
Measurement CCM 8.93 Should be 8.921 to 8.948 Using 2C14094G06
Measurement EHS 7.139 Should be 7.137 to 7.147
Measurement K 15.823 The length of the Pressure tube Coupling Nut

Calculated H.S.A 14.014

Differenc between K and J 0.018

Shim Required	FALSE
False no Shim, Ture Shim Req.	

HPTR SEATING DATA

H.S.A Actual 14.015 Final H.S.A Difference 0.001
Final Difference acceptable TRUE true is useable

A) Pressure Tube Coupling Nut

B) Pressure Tube Coupling Nut Minor Dia. Minor Dia. Acceptable TRUE True is Useable

1) Final Torque Achieved 12,000 FT LBS Final torque acceptable is less then 13800
2) Final Angle Achived 76 Degres Final Angle Acceptable greater then 76 and less then 84

NR5 Roller Bearing

NR5 Spanner Nut

Run on torque in ft LB 25 Run On torque meets Min req TRUE
Final Torque 2200 Final torque Acceptable is 2000-3000 Ft LBS

Heat Shield

Heat Shield Drop Check 0.336 Final acceptable drop has to be between .240 and .350



IPT Installation Worksheet

Calculated Dimension A (Drop from surface AF to surface AE)

A1 = Four Drop measurements from parallel bar
to HPT stator support AFT face

2:00 O'clock Location	=	<u>18.765</u>
4:00 O'clock Location	=	<u>18.763</u>
8:00 O'clock Location	=	<u>18.766</u>
10:00 O'clock Location	=	<u>18.782</u>
A1 Sum	=	<u>75.076</u>
Average of four A1 measurements	A2 =	<u>18.769</u>
A2 less parallel bar thickness	A3 =	<u>1.613</u>
A3 Less 0.093in	A	<u>17.063</u>

Calculated Shim Thickness

J02 (As marked on the IPT case)	<u>17.211</u>
Difference between Dimension J02 and A	
Calculated Shim Thickness	<u>0.148</u>

Calculated IPT Seating Dimension AJ

Coupling Nut Length	THK =	<u>1.74</u> Ref 1.170"
Measured Shim Thickness	AST =	<u>0.15</u>
IPT Shaft Flange Thickness	ST =	<u>0.587</u> Ref 0.590"
THK + AST + ST	=	TAS = <u>2.477</u>
Mid shaft to surface AF length	AH =	<u>2.452</u> Ref 2.420"
TAS-AH Can be positive or negative	Calc AJ =	<u>0.025</u>
Measured AJ	Act AJ =	<u>20</u>



Technical Report:

Conclusion –

Technical Inspection, VIGV was removed and sent to depot for cleaning. LPC cases were removed and sent to depot for cleaning. STG 3 shroud was replaced on LPC upper case due to worn delaminated Teflon seal. LPC and HPC rotors blades were dry ice clean. HPC cases were also dry ice clean. New VBV doors were installed. VIGV rigging was performed, adjustment was made to the shims. All premixers were replaced as a set.

WP, SB, SL, PB, PL Performed	Revision/manual reference	Date completed	Comments
WP 1113	VARIABLE INLET GUIDE VANE (VIGV) SYSTEM CHECK	June 11, 2020	Non
WP 1313	BYPASS VALVE, BELLCRANK, AND ACTUATING RING REPLACEMENT	June 11, 2020	Non
WP 1510	FUEL SYSTEM REPLACEMENT	June 11, 2020	Non
WP 2110	VARIABLE INLET GUIDE VANE (VIGV) ASSEMBLY	June 11, 2020	Non
WP 2213	LOW PRESSURE COMPRESSOR (LPC) STAGES 0-3	June 11, 2020	Non
WP 4012	GAS TURBINE EXTERNAL INSPECTION (VISUAL)	June 11, 2020	Non
WP 1916	HIGH PRESSURE COMPRESSOR WATER INJECTION (SPRINT) KIT REMOVAL AND INSTALLATION	June 11, 2020	Non

Parts Data:

Description	PN Removed	SN Removed	Qty	Disposition	PN Installed	SN Installed
VBV valve	L37239G02		12	replace	L56212G01	
hinge	L37241G01		12	replace	L37241G01	
pins	9106M39P04		12	replace	9106M39P04	
bolt	9130M96P03 4		24	replace	9130M96P06	
nut	MS21083C4		12	replace	MS21083C4	
LPC STG 3 shroud	L44637G01	HD949452-2	1	replace	L44637G01	ERCB1555



Premixer replacement:

Removed	Part #	Serial #	Installed	Part #	Serial #
1	L38165P02	PCYATF95	1	L38056P02	PHCHA953
2	L38166P02	PCYATG85	2	L38166P02	PCYHE634
3	L38165P02	PCYHE004	3	L38165P02	PATABP31
4	L38166P02	PCYATG96	4	L38057P02	PHCHB953
5	L38165P02	PCYATF94	5	L38165P02	PATABP25
6	L38166P02	PCYBBC24	6	L38057P02	PHCHB954
7	L38165P02	PCYARC41	7	L38056P02	PHCHA377
8	L38166P02	PCYATG94	8	L38057P02	PSDCJ131
9	L38165P02	PCYHE005	9	L38165P02	PCYMS547
10	L38166P02	PCYATG86	10	L38057P02	PHCHB372
11	L38165P02	PCYHE003	11	L38056P02	PHCHA950
12	L38166P02	PCYATG84	12	L38166P02	PCYWE637
13	L38165P02	PCYATF93	13	L38056P02	PHCHA947
14	L38166P02	PCYBBC26	14	L38057P02	PHCHB378
15	L38165P02	PCYATF92	15	L38165P02	PCYMS546
16	L38166P02	PCYBBC11	16	L38166P02	PCYCBF50
17	L38165P02	PCYATF97	17	L38165P02	PCYMS492
18	L38166P02	PCYBBC25	18	L38057P02	PHCHB951
19	L38165P02	PCYHE027	19	L38056P02	PHCHA366
20	L38166P02	PCYBBC15	20	L38166P02	PCYWE661
21	L38165P02	PCYHE002	21	L38165P02	PATABP28
22	L38166P02	PCYBBC10	22	L38057P02	PHCHB373
23	L38165P02	PCYATF99	23	L38056P02	PSDCH171
24	L38166P02	PCYBGR45	24	L38057P02	PHCHB949
25	L38165P02	PCYATF98	25	L38056P02	PHCHA944
26	L38166P02	PSDAH17	26	L38166P02	PCYMA966
27	L38165P02	PCYHE006	27	L38056P02	PHCHA942
28	L38166P02	PSDAH16	28	L38166P02	PSDAMD63
29	L38165P02	PCYHE007	29	L38165P02	PATABP30
30	L38166P02	PSDAH16	30	L38057P02	PHCHB371



Inspection Photos:



VIGV sent to depot for cleaning



VIGV sent to depot for cleaning



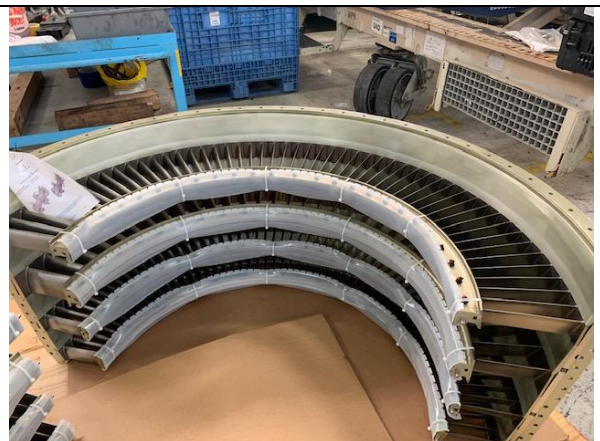
LPC rotor where dry ice cleaned



LPC rotor where dry ice cleaned



LPC cases sent to depot for cleaning



LPC cases sent to depot for cleaning



Inspection Photos:



STG 3 shroud replaced on upper case



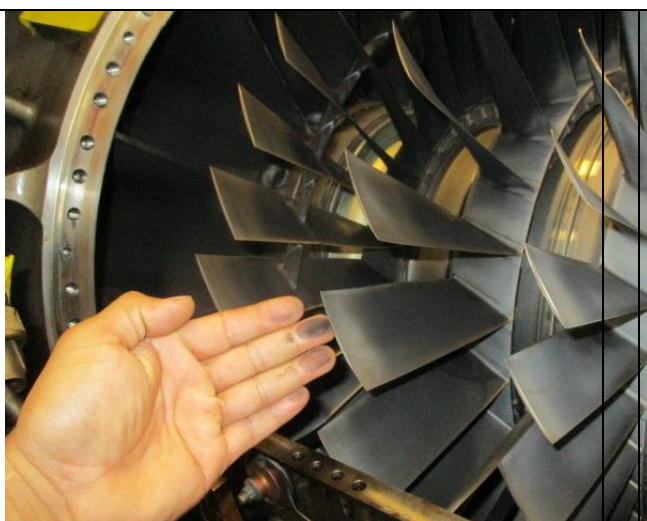
STG 3 shroud replaced on upper case



VBV doors replaced with new



VBV doors replaced with new



HPC rotor blades where dry ice cleaned



HPC rotor blades where dry ice cleaned



Inspection Photos:



HPC rotor blades where dry ice cleaned



HPC rotor blades where dry ice cleaned



HPC rotor blades where dry ice cleaned



STG 1 and STG 2 plugs replaced due to wear on tip



VIGV pinned at closed position



VIGV pinned at open position



HPC stage 3 to 5 blades replacement:

Conclusion –

The purpose of this visit was to perform HPC top case. STG 3- 5 blades where replaced. Stg 3-5 bushing where replaced. Stg 1 and Stg 2 shrouds where replaced due to damage. Stg 3 to Stg 5 rub buttons where replaced. HPC rotor blades and cases where dry ice cleaned.

Maintenance Data:

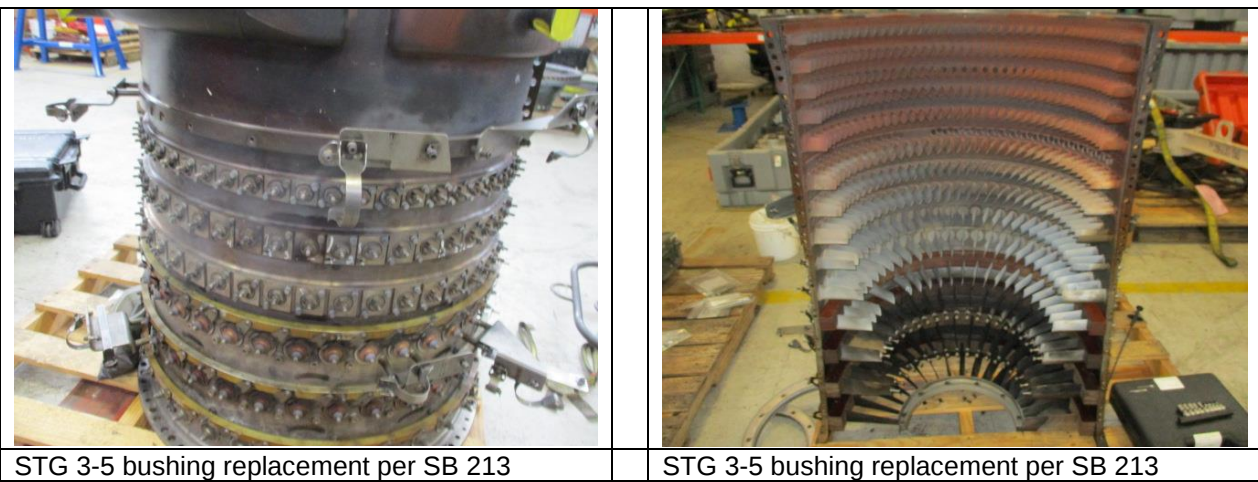
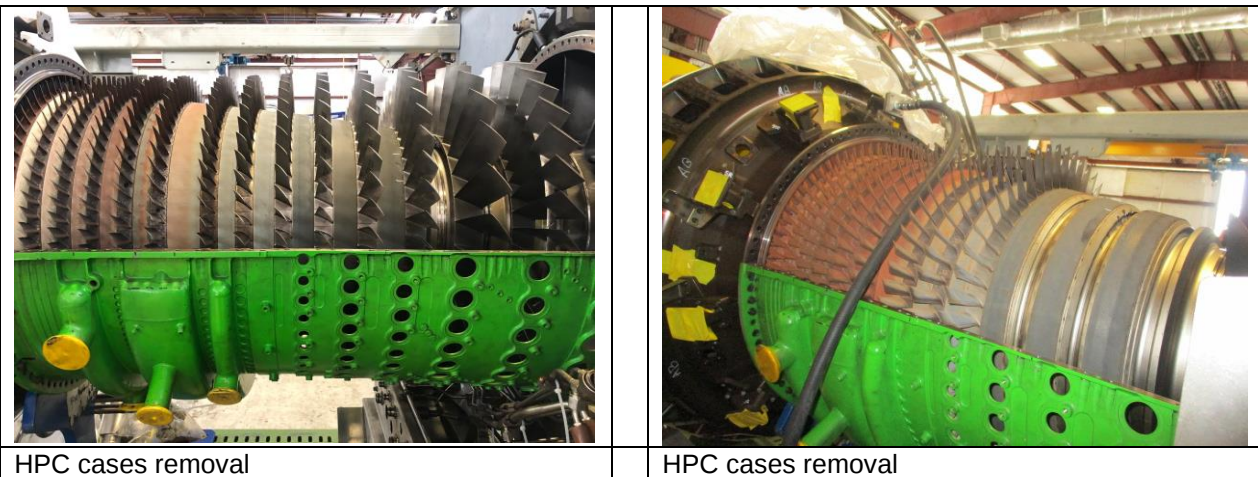
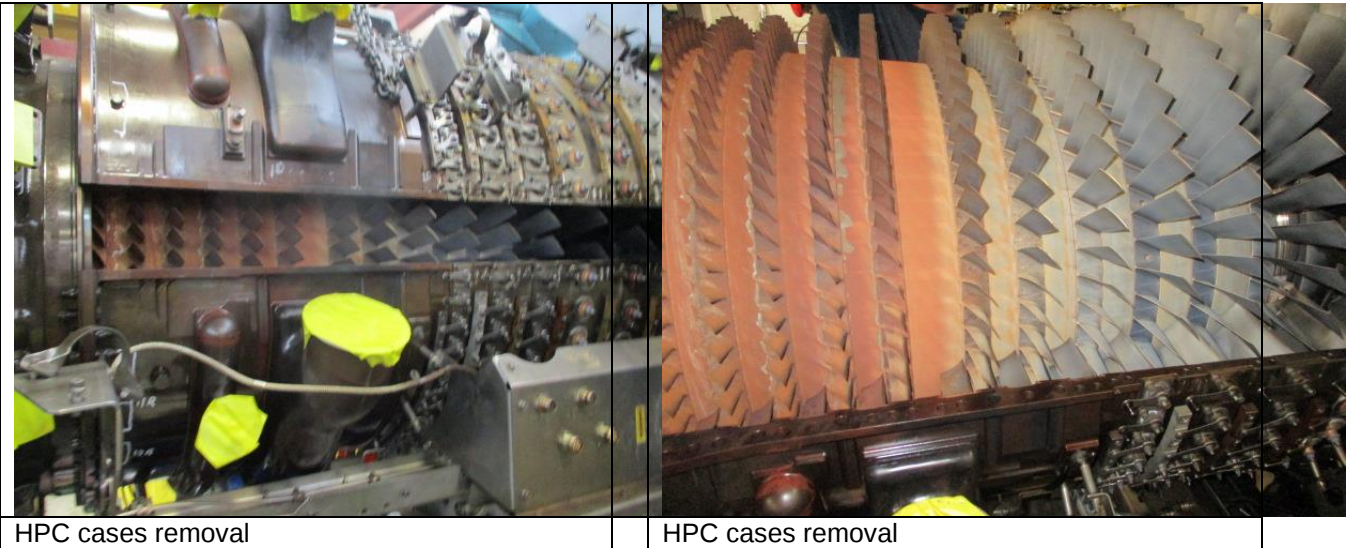
WP, SB, SL, PB, PL Performed	Revision/manual reference	Date completed	Comments
WP 2411 01	HIGH PRESSURE COMPRESSOR (HPC) UPPER AND LOWER STATOR CASE REPLACEMENT	July 4, 2020	Non
WP 1412 00	HIGH PRESSURE COMPRESSOR (HPC) STATOR VANES REPLACEMENT	July 4, 2020	Non
WP 2413 00	HIGH PRESSURE COMPRESSOR (HPC) ROTOR BLADES REPLACEMENT	July 5, 2020	Non
WP 1411 00	VARIABLE STATOR VANE (VSV) RIGGING	July 6, 2020	Non
WP 1412 00	VARIABLE STATOR VANE (VSV) STAGES 3 TO 5 BUSHING REPLACEMENT (HIGH-BOSS HPC STATOR CASE)	July 7, 2020	Non
LM6000-IND-0213	High Pressure Compressor Stator Stages 3 Through 5 Variable Stator Vane Bushings Replacement (All LM6000 Models)	July 7, 2020	Non
LM6000-IND-0310	High Pressure Compressor Rotor Stages 3 Through 5 Blades Dovetail Coating Refurbishment	July 7, 2020	Non

Parts Data:

Description	PN Removed	SN Removed	Qty	Disposition	PN Installed	SN Installed
STG 1 shroud	9379M41G05	NUM45822	1	replace	9379M41G05	NUMAO776
STG 1 shroud	9379M41G05	NUM45826	1	replace	9379M41G05	NUMA1531
STG 2 shroud	9379M42G04	TUA16P46	1	replace	9379M42G04	NUMA3002
STG 2 shroud	9379M42G04	TUA16P45	1	replace	9379M42G04	NUMA2970
STG 2 vane	K462P02		1	replace	K462P02	
STG 3 vane	K463P03		15	replace	K463P03	



HPC Photos:



HPC Photos:



STG 3-5 rub button replaced with new



STG 3-5 rub button replaced with new



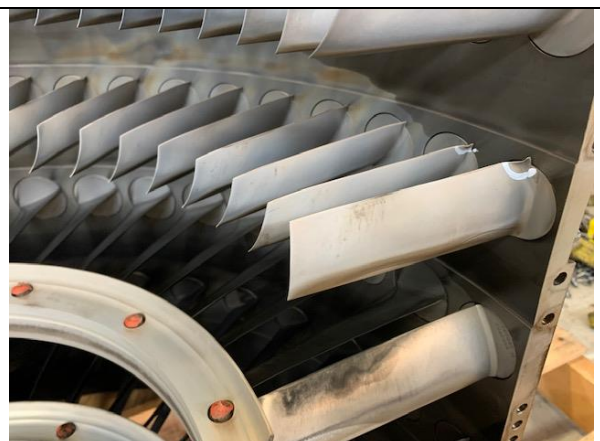
STG 2 and STG 2 shrouds replaced with new



STG 2 and STG 2 shrouds replaced with new



STG 2 and STG 2 shrouds replaced with new



Replaced a total of 15 vanes on STG 3 upper and lower cases

HPC Photos:



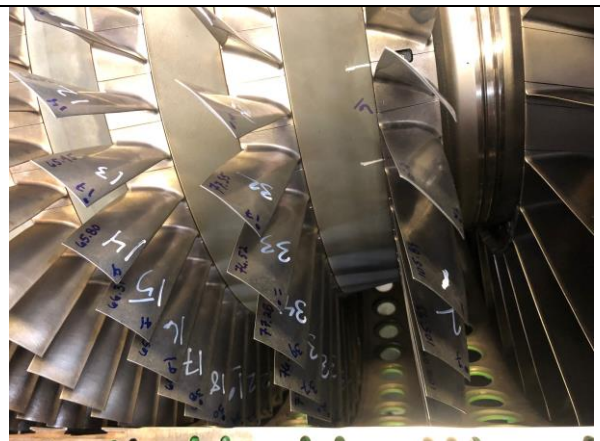
Replaced a total of 15 vanes on STG 3 upper and lower cases



Replace one vane on STG 2



Replaced STG 3-5 blades per SB 310



Replaced STG 3-5 blades per SB 310



HPC cases installed



HPC cases installed



High Pressure Compressor Stator Stages 3 Through 5 Variable Stator Vane Bushings Replacement (All LM6000 Models)

LM6000-IND-0213
Revision 5
April 10, 2019

SERVICE BULLETIN COMPLIANCE RECORD

GAS TURBINE S/N: 192-229 TOTAL HOURS _____
ACCOMPLISHED AT (LOCATION): Building B Houston Tooling Shop
BY WHOM: Kates, June DATE: 6-14-2020
DD/MM/YYYY

HARDWARE REMOVED

NOMENCLATURE	PART NUMBER	SERIAL NUMBER	QTY
Bushing STG 3/4	L44861P01		96
Washer STG 3/4	L44862P02		96
Washer STG 5	L44862P03		58
Bushing STG 5	L44861P07		58
Bolt STG 3-5	1855M35P08		91

HARDWARE RETAINED

NOMENCLATURE	PART NUMBER	SERIAL NUMBER	QTY
Bushing STG 3/4	L44861P01		96
Washer STG 3/4	L44862P02		96
Washer STG 5	L44862P03		58
Bushing STG 5	L44861P07		58
Bolt STG 3-5	1855M35P08		91

COMMENTS:

ENGINE STARTS

MAIL THIS FORM TO:

FLEET DATA QUALITY (FDQ) Team
General Electric Company
One Neumann Way
Mn. Drop 8-22
Cincinnati, OH 45215-1588

EMAIL THIS FORM TO:

- OR - aerotech.data@ge.com

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Aero Energy

LM6-209 - V.1

High Pressure Compressor Rotor Stages 3 Through 5 Blades Dovetail Coating Refurbishment

LM6000-IND-0310
Revision 1
October 24, 2018

SERVICE BULLETIN COMPLIANCE RECORD

GAS TURBINE S/N: 192-229 TOTAL HOURS: N/A

ACCOMPLISHED AT (LOCATION): Houston - FieldCore Shop - Bldg. B

BY WHOM: Joseph Scolaro DATE: 18/06/2020

DD/MM/YYYY

HARDWARE REMOVED

NOMENCLATURE	PART NUMBER	SERIAL NUMBER	QTY
Blade, Compressor Rotor - Stage 3	K543P20 / K543P17 / K543P28 K543P19 / K543P18 / K543P25	N/A	20/17/1 2/2/1
Blade, Compressor Rotor - Stage 4	K544P16 / K544P13 K544P15 / K544P14	N/A	24/17 2/2
Blade, Compressor Rotor - Stage 5	K545P16 / K545P13 K545P15 / K545P14	N/A	31/13 2/2
Stage 3 - LOCKING LUG - ASSY	9173M90001	N/A	2
Stage 4 - LOCKING LUG - ASSY	9173M90035	N/A	2
Stage 5 - LOCKING LUG - ASSY	9173M90030	N/A	2

HARDWARE INSTALLED

NOMENCLATURE	PART NUMBER	SERIAL NUMBER	QTY
Blade, Compressor Rotor - Stage 3	K543P64 / K543P61 K543P63 / K543P62	N/A	18/21 2/2
Blade, Compressor Rotor - Stage 4	K544P16 / K544P13 K544P15 / K544P14	N/A	20/21 2/2
Blade, Compressor Rotor - Stage 5	K545P16 / K545P13 K545P15 / K545P14	N/A	25/18 2/2
Stage 3 - LOCKING LUG - ASSY	2032M95017	N/A	2
Stage 4 - LOCKING LUG - ASSY	2032M95013	N/A	2
Stage 5 - LOCKING LUG - ASSY	2032M95012	N/A	2

COMMENTS: _____

ENGINE STARTS: _____

MAIL THIS FORM TO: FLEET DATA QUALITY (FDQ) Team
General Electric Company
One Neumann Way
Mail Drop S122
Cincinnati, OH 45215-1988

EMAIL THIS FORM TO: aerotechdata@ge.com

- OR -

3003517-03-A2A

Unplanned LPC-HPC Cleaning Scope Steam/Ice blasting:

**LPC-HPC Findings and additional scope of work:**

VIGV rig check is performed minor adjustments were made to the Actuator brackets to set insert pin at 10dgr further all in serviceable condition.

VIGV's removed for cleaning purposes.

VIGV's and # 5 race were found heavily polluted with black deposit and requires Ice Blasting Cleaning.

HPC top case is removed first for the implementation of SB-310 stg 3 to 5 blade replacement.

HPC blades and vanes are exposed and were found heavily polluted with black deposit and requires Ice Blasting Cleaning.

HPC lower case removed by using dummy casing.

HPC rotor Ice Blasting Cleaning was performed.

HPC casings Steam Cleaning and Ice Blasting was performed.

01 HPC Vane Stage 2 found damaged in lower casing and requires replacement for new.

15 HPC Vane Stage 3 found damaged in upper casing and requires replacement for new.

LPC top case removed and rotor - stator found heavily polluted with black deposit to clean blades.

LPC rotor Ice Blasting Cleaning was performed.

LPC casings Steam Cleaning and Ice Blasting was performed.

There are some vanes on STG 3 top case with blade curl at the root.

Shrouds on STG 1 and STG 2 would need to be replace on both cases, Teflon seal is eroded.

Damaged LPC Shroud stg3 Upper-Lower Case	
	
Missing Teflon and seal delamination	Missing Teflon and seal delamination
	
Missing Teflon and seal delamination	Missing Teflon and seal delamination
Damaged HPC Shroud stg1/2 Upper-Lower Case	



Missing Teflon and seal delamination



Missing Teflon and seal delamination



Missing Teflon and seal delamination



Missing Teflon and seal delamination

Damaged HPC Vanes stg3 Upper/Lower Case



HPC Vanes stg3





HPC Vanes stg3



Damaged HPC Vane Lower Case stg2



Damaged Water Manifold



Damaged Water Manifold

LPC, HPC, and VIGV before and after Ice / Steam cleaning

Note: There is heavy black pollution on vanes which requires Steam and Ice Cleaning to remove it.
VIGV – LPC - HPC Rotors were dry ice cleaned, Cases where first steam cleaned and HPC Cases had additional dry ice clean after steam cleaning, VIGV and # 5 race is also steam cleaned.





LPC, HPC Rotors with Dummy Cases and Dummy LPT:

LPC, HPC Cases were removed to perform Ice Cleaning and replacing the damages Vanes / Shrouds

LPT was removed to remove and exchange TRF rotatable and installation of new seals

VIGV was removed to perform Cleaning

